

REMARKS

Applicant respectfully requests reconsideration and allowance of claims 1, 3, 5-11, and 13-14, which are pending in the above-identified application. Claims 1, 3, 5-8, 10, 12, and 14 stand rejected. Claims 9, 11, and 13 stand withdrawn. Applicant has cancelled claims 8 and 12 herein. Applicant has amended claims 1, 7, 10, and 14. No new matter is added by the amendments herein. In view of the following discussion, Applicant submits that all pending claims are in condition for allowance.

Claim Objections:

At numbered part 3 of the Office Action, the Examiner has objected to claims 1-6 because of an informality regarding the recitation of “a surface” instead of “another surface”. Applicant has amended independent claim 1 to recite “another surface” as suggested by the Examiner. To avoid a similar rejection for independent claim 7, Applicant has amended independent claim 7 to similarly recite “another surface”. As such, Applicant submits that the Examiner’s objection to claims 1-6 has been overcome, and respectfully requests that the Examiner’s claim objection be withdrawn.

Claim Rejections under 35 U.S.C. §101:

At numbered parts 4-5 of the Office Action, the Examiner has rejected claim 12 under 35 U.S.C. §101 as being directed to non-statutory subject matter. Applicant has cancelled claim 12 herein. As such, Applicant submits that the Examiner’s rejection has been overcome, and respectfully requests that the Examiner’s § 101 rejection be withdrawn.

Claim Rejections under 35 U.S.C. §102:

At numbered parts 6-7 of the Office Action, the Examiner has rejected claims 1, 3, and 5-8 under 35 U.S.C. § 102(b) as being anticipated by Song et al. (U.S. Pat. Pub. No. 2004/0019452). Applicant respectfully traverses the Examiner’s rejection.

Amended independent claims 1 and 7 recite “a controller which is operable to drive the primary cooling unit and the auxiliary cooling unit and drives at least one of the primary cooling unit

and the auxiliary cooling unit based on how heat is generated from the electronic device so as to cool the electronic device”. (Emphasis added.)

Song et al. does not disclose or suggest a controller which is operable to drive the primary cooling unit and the auxiliary cooling unit as presently claimed in amended independent claims 1 and 7 of the instant application. The present invention as claimed in amended independent claims 1 and 7 requires positively cooling the electronic device using two direct (active) cooling units, and thus achieves a unique cooling effect. From FIGS. 2B-3 and related text in at least paragraphs [0029-0033], Song et al. teaches cooling the semiconductor device S using one active nozzle assembly 170 and one indirect heat sink 180. From paragraphs [0033-0034], Song et al. states that “The first and second solenoid valves 150 and 160 [which control the flow of liquid gas and dry air, respectively, to the mixer 130 of the Song et al. device] are operated by the control unit 190 which electrically controls operation of the handler” (emphasis added), and “[a] filter assembly 140 is provided on a flow line connecting the mixer 130 and the nozzle assembly 170.” Indeed, the control unit 190 controls the spraying of cooling fluid through nozzle assembly 170. From paragraph [0030], Song et al. states that the heat sink(s) 180 “are brought into surface to surface contact with the semiconductor device(s) S to cool down the semiconductor device(s) [S]”. (Emphasis added.) Indeed, only the nozzle assembly 170 is subject to driving by the control unit 190 because the heat sink(s) 180 operate independently, and, therefore, are not driven by control unit 190.

In contrast, the controller is operable to drive the two actively and positively cooling units of the present invention as claimed in amended independent claims 1 and 7 of the instant application. By way of example, as disclosed in paragraph [0052] of the instant application, efficient cooling of the electronic device 200 suitable for the type of heat generated is achieved such that:

heat generated from the electronic device 200 on a constant basis is removed by air cooling using the heat sink 252 and the electric fan. Meanwhile, heat generated from the electronic device 200 temporarily or instantaneously is removed by jet cooling. The electronic device cooling apparatus 100 according to the embodiment is capable of promptly responding to variation in the amount of heat generated from the electronic device 200, by driving a jet cooling mechanism as an auxiliary means.

From paragraphs [0040-0043], by way of example of at least one embodiment of the present invention of the instant application, a controller 110 includes a nozzle controller 120 and an electric

fan controller 130. From FIGS. 1-2 and paragraph [0041], the specification of the instant application as originally filed states that “[t]he electric fan controller 130 sends a control signal to the electric fan unit 106 so as to drive the electric fan [of the heat sink 252].” (Emphasis added.) From FIGS. 1-2 and paragraph [0042], the specification of the instant application as originally filed states that “[t]he nozzle controller 120 sends a control signal to the nozzle unit 102 so as to drive the jet cooling apparatus 300.” (Emphasis added.) Indeed, the controller 110 is operable to drive both the electric fan of the heat sink 252 and the jet cooling apparatus 300.

Moreover, the primary and auxiliary cooling units of the present invention as claimed in amended independent claims 1 and 7 operate based on different cooling mechanisms. Effective cooling of the electronic device 200 is driven based on how heat is generated from the electronic device, and using different cooling mechanisms to react to how heat is generated achieves effective cooling.

In view of the above, Song et al. does not disclose or suggest each and every limitation of amended independent claims 1 and 7. As such, amended independent claims 1 and 7 are, therefore, patentable. As claims 3 and 5-6 depend from amended independent claim 1, and recite additional patentable features, claims 3 and 5-6 are, therefore likewise patentable.

In view of the above, Applicant respectfully requests that the Examiner’s §102 rejections be withdrawn.

Claim Rejections under 35 U.S.C. §103:

At page 5 of the Office Action, the Examiner has rejected claims 10, 12, and 14 under 35 U.S.C. § 103(a) as being unpatentable over Song et al. (U.S. Pat. Pub. No. 2004/0019452). Applicant respectfully traverses the Examiner’s rejection.

Amended independent claim 10 recites “determining whether the measured temperature exceeds a first predetermined threshold value; cooling the surface of the electronic device by a first cooling unit when the measured temperature exceeds the first predetermined threshold value...wherein the first cooling unit is based on a cooling mechanism different from that of the second cooling unit.” (Emphasis added.)

Song et al. does not disclose or suggest determining whether the measured temperature exceeds a first predetermined threshold value...wherein the cooling units are based on different cooling mechanisms as presently claimed in amended independent claim 10 of the instant application. From FIGS. 4-6 and related text, Song et al. discloses a closed mode, open mode, and model reference all of which employ measuring the temperature change rate of the device. Particularly from FIG. 4 and paragraph [0042], Song et al. states that “the control unit 190 checks a temperature change [rate] of the semiconductor device(s) [S] measured at the temperature sensor 181, and determines if the temperature change [rate] is higher than a preset value in step S44.” (Emphasis added.) Indeed, Song et al. discloses or suggests comparing the temperature change rate against a preset value. As such, Song et al. does not disclose or suggest determining whether a measured temperature exceeds a first predetermined threshold value as claimed in amended independent claim 10. Consequently, Song et al. does not cool the surface of the electronic device by a first cooling unit when the measured temperature exceeds the first threshold value, wherein the first cooling unit is based on a cooling mechanism different from that of the second cooling unit as claimed in amended independent claim 10. As such, the teachings of Song et al. do not result in the present invention as claimed in amended independent claim 10, and, therefore, amended independent claim 10 is patentable.

Amended independent claim 14 recites “a first determining module which determines whether the measured temperature exceeds a first predetermined threshold value; a first cooling module which causes a first cooling unit to cool the surface of the electronic device when the measured temperature exceeds the first predetermined threshold value... wherein the first cooling unit is based on a cooling mechanism different from that of the second cooling unit.” (Emphasis added.)

Song et al. does not disclose or suggest a first determining module which determines whether the measured temperature exceeds a first predetermined threshold value...wherein the cooling units are based on different cooling mechanisms as presently claimed in amended independent claim 10 of the instant application. The patentability of determining whether the measured temperature exceeds a first predetermined threshold value and cooling the surface of the electronic device over Song et al. was discussed above with regard to amended independent claim 10. The remarks apply with equal weight to amended independent claim 14. Because Song et al. does not disclose or suggest

determining whether the measured temperature exceeds a first predetermined threshold value, Song et al., therefore, lacks a first determining module as claimed in amended independent claim 14. Consequently, because Song et al. does not cool the surface of the electronic device by a first cooling unit when the measured temperature exceeds the first threshold value, wherein the first cooling unit is based on a cooling mechanism different from that of the second cooling unit, Song et al., therefore, lacks a first cooling module as presently claimed in amended independent claim 14. As such, the teachings of Song et al. do not result in the present invention as claimed in amended independent claim 14, and, therefore, amended independent claim 14 is patentable.

Because Applicant has cancelled claim 12 herein, the Examiner's §103 rejection with respect to claim 12 has been overcome. In view of the above, Applicant respectfully requests that the Examiner's §103 rejections be withdrawn.

Conclusion:

In view of the foregoing, Applicant submits that the instant claims are in condition for allowance. Early and favorable action is earnestly solicited. In the event there are any further fees due and owing in connection with this matter, please charge same to our Deposit Account No. 11-0223.

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